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August 24, 2016

Arthur Burbank
USDA Forest Service
4350 South Cliffs Dr.
Pocatello, ID 83204

Subject: Biological Selenium Removal Treatment Technology
Fluidized Bed Bioreactor Pilot Study
July 2016 Progress Report

Dear Art,

This progress report summarizes key activities in July 2016 associated with the fluidized bed bioreactor (FBR) pilot study located near Hoopes Spring. This pilot study is being conducted as part of the Smoky Canyon Mine Remedial Investigation/Feasibility Study (RI/FS) to provide information on the effectiveness of the active biological treatment system in removing selenium and other COPCs from South Fork Sage Creek Springs and Hoopes Spring. Operation and monitoring of the pilot study follows the *Pilot Study Work Plan and Sampling and Analysis Plan (Work Plan/SAP), Biological Selenium Removal Treatment Technology Fluidized Bed Bioreactor* (prepared by Formation Environmental, dated September 2014, with revised text and tables dated March 5, 2015), along with Work Plan/SAP Addenda 01 through 04.

Weekly sample collection during the 12-week performance testing period was completed on June 28, after which sampling has been conducted every other week. The system is currently operational, and samples collected during the month of July were analyzed for the focused analyte list only, as specified in the Work Plan/SAP.

The following sampling events were conducted in July 2016:

- Week 13 sampling on July 6; and
- Week 15 sampling on July 20.

Identification of Deliverables and Data Transmittals

At the time of this report, the 12-week performance testing has been completed, and laboratory data for Weeks 13 and 15 of the every other week testing period have been received. Preliminary laboratory data are presented in Table 1. Field data for Weeks 11 through 12 of the performance testing period and Week 13 of the every other week testing period are presented in Table 2.

There were no outstanding deliverables or transmittals for the month of July.

Upcoming Activities

The following activities associated with the FBR pilot study are planned through August 2016:

- As per the Work Plan/SAP, sample collection will continue every other week (focused analyte list only). This phase of sampling began on July 6.
- Preparation of the Work Plan/SAP for Phase 2 of the FBR treatability study, which includes addition of reverse osmosis and an increase in treatment system flow capacity.

Please contact me if there are questions regarding this monthly progress report.

Sincerely,

Monty Johnson
Environmental Engineering Manager

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Table 1
Laboratory Results Focused Analyte List

		Week 13		Week 15	
	Station >>	**Influent**	**Effluent**	**Influent**	**Effluent**
	Sample ID >>	SC0716-LSSHS-IN001	SC0716-LSSHS-EF001	SC0716-LSSHS-IN002	SC0716-LSSHS-EF002
	Date >>	7/6/2016	7/6/2016	7/20/2016	7/20/2016
Analyte	**Units**				
General Chemistry					
Nitrate as N	mg/L	0.43	0.14	0.34	0.08
Total Phosphorus as P	mg/L	0.0201	0.0878	0.0196	0.136
Total Sulfide	mg/L	1 U	1 U	1 U	1 U
Metals and Metalloids					
Selenium, Dissolved	mg/L	0.123	0.00535	0.116	0.00454
Selenium, Total	mg/L	0.126	0.00545	0.123	0.00483

Notes:
Results presented are preliminary, and have not been validated at the time of this report.
U - Analyte not detected above the method detection limit (MDL).
J - Result is estimated.

Week 11	Station >>	Influent	Effluent
	Sample ID >>	SC0616-LSSHS-IN004	SC0616-LSSHS-EF004
	Date >>	6/21/2016	6/21/2016
Analyte	Units		
Dissolved Oxygen	mg/L	8.74	7.49
ORP	mV	170	146
pH	SU	7.31	6.66
SC	umhos/cm	452	479
Temperature	C	13.59	12.92
Turbidity	NTU	2	6

Week 12	Station >>	Influent	Effluent
	Sample ID >>	SC0616-LSSHS-IN005	SC0616-LSSHS-EF005
	Date >>	6/28/2016	6/28/2016
Analyte	Units		
Dissolved Oxygen	mg/L	8.6	7.59
ORP	mV	181	191
pH	SU	7.27	6.81
SC	umhos/cm	446	488
Temperature	C	13.64	12.81
Turbidity	NTU	2	6.6

Week 13	Station >>	Influent	Effluent
	Sample ID >>	SC0716-LSSHS-IN001	SC0716-LSSHS-EF001
	Date >>	7/6/2016	7/6/2016
Analyte	Units		
Dissolved Oxygen	mg/L	8.68	7.6
ORP	mV	198	170
pH	SU	7.21	6.69
SC	umhos/cm	464	478
Temperature	C	13.49	12.78
Turbidity	NTU	1.8	10.6